Remarks:

Reconsideration of the application is requested.

Claims 1-20 remain in the application. Claim 1 has been amended. A marked-up version of the claim is attached hereto on a separate page.

In item 2 on page 2 of the above-noted Office action, claims 1-3 and 8-11 have been rejected as being fully anticipated by Vasudev (U.S. Patent No. 4,617,066) under 35 U.S.C. § 102.

In item 5 on page 3 of the Office action, claims 4-7 have been rejected as being obvious over Vasudev (U.S. Patent No. 4,617,066) in view of Maszara et al. (U.S. Patent No. 6,362,063 B1) under 35 U.S.C. § 103.

The rejections have been noted and the claims have been amended in an effort to even more clearly define the invention of the instant application. The claims are patentable for the reasons given below. Support for the changes is found in Figs. 1a and 1b and on page 7, lines 21-22 of the specification.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

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Claim 1 calls for, inter alia:

"producing a doping at a surface of the semiconductor substrate;

after producing the doping, applying a layer selected from the group consisting of a polycrystalline layer and an amorphous layer to the surface".

The Vasudev et al. reference discloses in Figs. 1a-1f a method of producing a very steep retrograde distribution of a rapidly diffusing species in a near-surface layer of a substantially perfect base crystal (column 1, lines 11-13).

Fig. 1a discloses a silicon on sapphire (SOS) wafer (10) having a silicon layer (12), deposited on the surface of sapphire substrate (14), and a silicon sapphire interface (16).

Fig. 1(b) discloses the step whereby the silicon layer (12), "is first treated by amorphizing to modify its normal crystalline structure to an amorphous structure, which reduces the diffusivity and implant channeling of a subsequently implanted species" (column 5, lines 61-64). Furthermore, Fig.

1(b) discloses that "amorphizing is accomplished by implanting ions 18,... into the wafer 10" (column 5, lines 65-66).

Fig. 1c discloses the step whereby "a desired dopant species 26 is implanted into the amorphized layer 20 in the desired distribution" whereby "desired distribution is a steep retrograde distribution" (24), whereby the term "retrograde distribution" indicates that "that the concentration of the dopant species near the interface 16 is less than the concentration nearer to the base crystal surface 22" (column 6, lines 54-62).

Figs. 1d and 1e disclose the steps whereby the amorphized layer (20) becomes "recrystallized back to epitaxial, fully crystalline layer 12 by annealing the wafer 10. Annealing is accomplished by heating the wafer 10..." (column 7, line 66 through column 8, line 1).

Fig. 1f discloses the step of activating the implanted dopant species by using a rapid transient anneal to "produce an activated distribution 28" (column 9, lines 6-7).

The reference does not show initially producing a doping at a surface of the semiconductor substrate, and then after producing the doping, applying a layer selected from the group consisting of a polycrystalline layer and an amorphous layer

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to the surface, as recited in claim 1 of the instant application. The Vasudev et al. reference teaches that the step of "producing a doping at a surface of the semiconductor" is carried out after the step of producing an amorphous layer. This is contrary to the method as claimed in the instant application, in which "producing a doping at a surface of the semiconductor" is carried out before the step of "applying a layer selected from the group consisting of a polycrystalline layer and an amorphous layer to the surface" is carried out.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

Even though claim 1 is believed to be patentable further discussion of the Vasudev et al. reference is given below. The method of claim 1 has several advantages, i.e. the depth of the doped layer can be freely selected by the thickness of the applied polycrystalline and/or amorphous layer (poly/α layer). In this way, buried doped layers of any depth within a semiconductor can be produced (page 5, lines 4-7). Also the depth of the doped layer is independent of the method by which the profile of the doped layer is produced, since the doped

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layer is produced before the poly/α layer is applied to the semiconductor. This allows for "considerable freedom in the formation of the three-dimensional doping configuration" (page 5, lines 7-14). The Vasudev et al. reference does not offer any of the above-noted advantages. There is no indication in the Vasudev et al. reference that the amorphous layer is applied later, i.e. on top of the doped layer, to produce a buried doped layer with a predetermined depth.

Furthermore, the Vasudev et al. reference uses the amorphous layer to stop the implanted material "to avoid channeling so that the characteristics of the distribution are preserved through later processing steps" (column 6, lines 64-68). There is no hint in the Vasudev et al. reference to use the amorphous layer for any other purpose, such as for providing a buried doping layer according to the invention of the instant application.

Further, there is no indication in the Vasudev et al. reference that the advantages of the method according to claim 1 are anticipated. Therefore, a person of ordinary skill in the art would not use the disclosure of the Vasudev et al. reference to proceed in the direction of the method of claim 1. Also, due to the complexity of semiconductor process technology, a person of ordinary skill in the art would not be motivated to simply change the order of the processing steps

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without knowing what benefits would be derived. Therefore claim 1 is not made obvious by the Vasudev et al. reference.

The Maszara et al. reference does not make up for the deficiencies of the Vasudev et al reference.

It is appreciatively noted from item 9 on page 3 of the Office action, that claims 12-20 would be allowable if rewritten in independent form including the limitations of the base claim and any intervening claims. The claims have not been amended in this manner, as claim 1 is believed to be allowable in its current form.

In view of the foregoing, reconsideration and allowance of claims 1-20 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone call so that, if possible, patentable language can be worked out.

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Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner & Greenberg P.A., No. 12-1099.

Respectfully submitted,

LAURENCE A. GREENBERG
REG. NO. 29,308

For Applicant(s)

AKD:cgm

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Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101

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Marked-up version of the claims:

Claim 1 (amended). A process for producing a doped semiconductor substrate, which comprises the following steps:

providing a semiconductor substrate;

producing a doping at a surface of the semiconductor substrate;

after producing the doping, applying a layer selected from the group consisting of a polycrystalline layer and an amorphous layer to the surface; and

carrying out a heat treatment step for producing an epitaxial layer and a buried doping.

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